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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/607,967	06/27/2003	William M. Radich	S104.12-0037/STL 11305	3060

27365 7590 04/17/2006

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EXAMINER	
CHAUDRY, MUJTABA M	
ART UNIT	**PAPER NUMBER**
2133	

DATE MAILED: 04/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/607,967	RADICH, WILLIAM M.	
	Examiner	Art Unit	
	Mujtaba K. Chaudry	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 June 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Applicant's response was received January 19, 2006.

- Claims 1-20 remain pending.
- No amendments have been made to the claims.
- No amendments have been made to the drawings.

Application pending.

Drawings

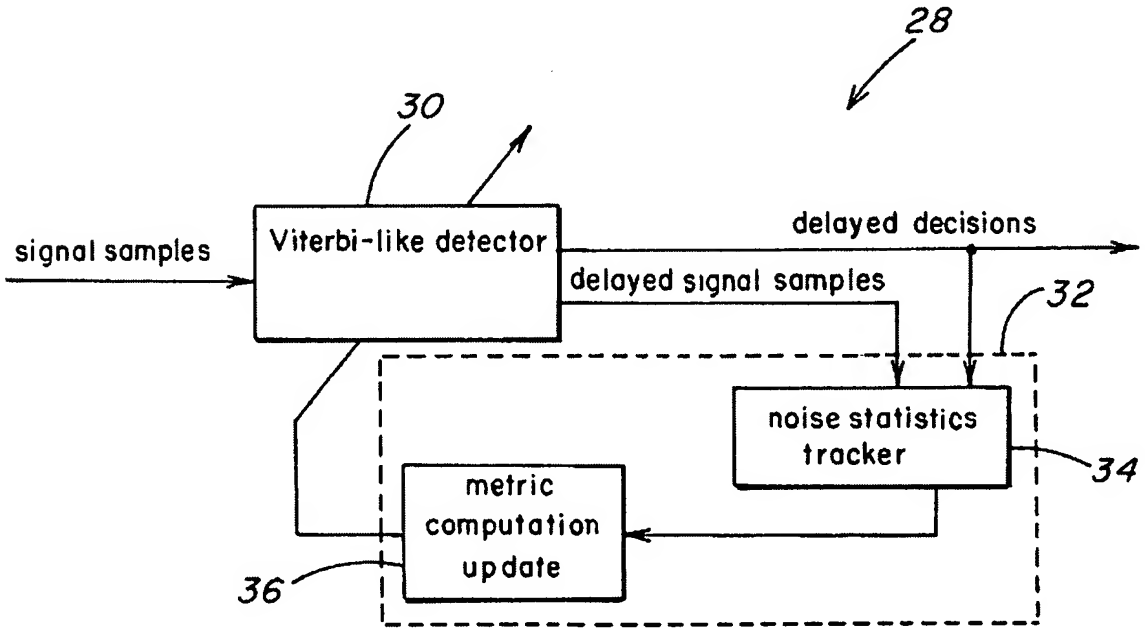
Applicant insists that Figures 1 and 2-1 should not be labeled as "Prior Art" and cites MPEP 608.02(g). The Examiner respectfully disagrees and would like to point out that all that which is depicted in Figures 1 and 2-1 is known in prior art and should therefore be labeled as such. If for any reason Applicant feels otherwise, the Examiner respectfully requests the Applicant to explicitly point to those reference numbers in Figures 1 and 2-1 that are of the present invention. The Examiner would like to remind the Applicant that although the "invention" may include, in part, the prior art since it may be an improvement thereof, a figure is only acceptable without a "Prior Art" label if that which is depicted incorporates the novel feature of the invention. Appropriate correction is requested.

Response to Amendment

Applicant's arguments/amendments with respect to previous presented claims 1-20 filed January 19, 2006 have been fully considered but are not persuasive. The Examiner would like to point out that this action is made final (See MPEP 706.07a).

Applicant contends, "...Kavcic (prior art of record) does not teach or suggest computing the branch metric values as a function of transition jitter statistics corresponding to the signal samples..." The Examiner respectfully disagrees. Figure 2 (below) of Kavcic clearly shows the Viterbi detector 30, which performs branch metric calculations, dependent on the feedback signal samples and noise/statistics 34.

FIG. 2



The Examiner disagrees with the Applicant and maintains rejections with respect to pending claims 1-20. All arguments have been considered. It is the Examiner's conclusion that claims 1-20, as presented, are not patentably distinct or non-obvious over the prior art of record. See office action:

Claim Rejections - 35 USC § 102

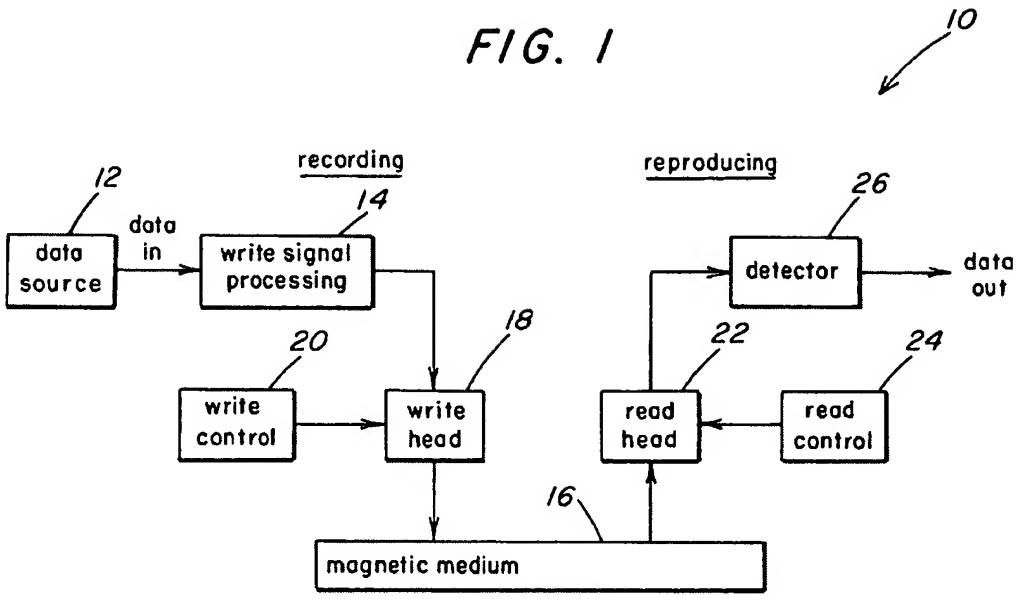
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 7, 8, 11, 12, 17, 18 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kavcic et al. (USPN 6438180).

As per claim 1, Kavcic et al. (herein after referred to as one entity: Kavcic) teaches (abstract and Figure 1) a method of determining branch metric values in a detector. The method includes receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The method also includes selecting a branch metric function at a certain time index and applying the selected function to the signal samples to determine the metric values.

FIG. 1



As per claim 2, Kavcic teaches, in view of above rejections, receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The noise is caused by coloring by front-end equalizers, media noise, media nonlinearities, and magnetoresistive (MR) head nonlinearities. This noise coloring causes significant performance degradation at high recording densities. Thus, there is a need for an adaptive correlation-sensitive maximum likelihood sequence detector which derives the maximum likelihood sequence detector (MLSD) without making the usual simplifying assumption that the noise samples are independent random variables.

As per claims 7 and 8, Kavcic teaches (col. 15) the generalization of the BCJR algorithm can be made for any other soft output or hard output algorithm defined on a trellis or a graph of any communications (or other dynamic) system.

As per claim 11, Kavcic teaches (abstract) a method of determining branch metric values in a detector. The method includes receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The method also includes selecting a branch metric function at a certain time index and applying the selected function to the signal samples to determine the metric values.

As per claim 12, Kavcic teaches, in view of above rejections, receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The noise is caused by coloring by front-end equalizers, media noise, media nonlinearities, and magnetoresistive (MR) head nonlinearities. This noise coloring causes significant performance degradation at high recording densities. Thus, there is a need for an adaptive correlation-sensitive maximum likelihood sequence detector which derives the maximum likelihood sequence detector (MLSD) without making the usual simplifying assumption that the noise samples are independent random variables.

As per claims 17 and 18, Kavcic teaches (col. 15) the generalization of the BCJR algorithm can be made for any other soft output or hard output algorithm defined on a trellis or a graph of any communications (or other dynamic) system.

As per claim 20, Kavcic teaches (abstract) a method of determining branch metric values in a detector. The method includes receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The method also includes selecting a branch metric

function at a certain time index and applying the selected function to the signal samples to determine the metric values.

Claim Rejections - 35 USC § 103

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 3-6, 9-10, 19 and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kavcic et al. (USPN 6438180).

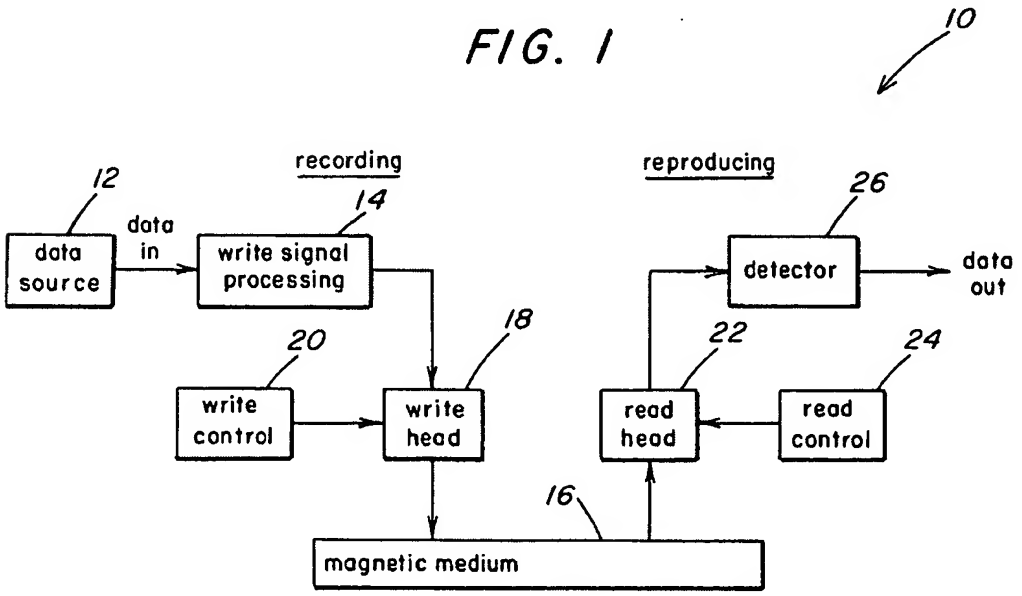
As per claims 3-6, Kavcic substantially teaches (col. 3, lines 20-68) a noise statistics tracker circuit 34 uses the delayed samples and detector decisions to update the noise statistics, i.e., to update the noise covariance matrices. A metric computation update circuit 36 uses the updated statistics to calculate the branch metrics needed in the Viterbi-like algorithm. The algorithm does not require replacing current detectors. It simply adds two new blocks in the feedback loop to adaptively estimate the branch metrics used in the Viterbi-like detector 30. The Viterbi-like detector 30 typically has a delay associated with it. Until the detector circuit 28 is initialized, signals of known values may be input and delayed signals are not output until the detector circuit 28 is initialized. In other types of detectors, the detector may be initialized by having the necessary values set.

Kavcic does not explicitly teach to calculate branch metric values using the various functions as stated in the present application.

However, Kavcic does teach (cols. 4-10) some functions to calculate branch metric values. Kavcic teaches (col. 7) that in the derivations of the branch metrics no assumptions were made on the exact Viterbi-type architecture, that is, the metrics can be applied to any Viterbi-type algorithm such as PRML, FDTS/DF, RAM-RSE, or, MDFE. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate branch metric values using the various functions within the teachings of Kavcic. This modification would have been obvious to one of ordinary skill in the art because one of ordinary skill in the art would have recognized that calculating branch metric values using the various functions would optimize the branch metric value calculations.

As per claims 9, 10 and 19, Kavcic substantially teaches (Figure 1) the detector to be part of the read channel and is post processor.

FIG. 1



As per claims 13-16, Kavcic substantially teaches (col. 3, lines 20-68) a noise statistics tracker circuit 34 uses the delayed samples and detector decisions to update the noise statistics, i.e., to update the noise covariance matrices. A metric computation update circuit 36 uses the updated statistics to calculate the branch metrics needed in the Viterbi-like algorithm. The algorithm does not require replacing current detectors. It simply adds two new blocks in the feedback loop to adaptively estimate the branch metrics used in the Viterbi-like detector 30. The Viterbi-like detector 30 typically has a delay associated with it. Until the detector circuit 28 is initialized, signals of known values may be input and delayed signals are not output until the detector circuit 28 is initialized. In other types of detectors, the detector may be initialized by having the necessary values set.

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However, Kavcic does teach (cols. 4-10) some functions to calculate branch metric values. Kavcic teaches (col. 7) that in the derivations of the branch metrics no assumptions were made on the exact Viterbi-type architecture, that is, the metrics can be applied to any Viterbi-type algorithm such as PRML, FDTS/DF, RAM-RSE, or, MDFE. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate branch metric values using the various functions within the teachings of Kavcic. This modification would have been obvious to one of ordinary skill in the art because one of ordinary skill in the art would have recognized that calculating branch metric values using the various functions would optimize the branch metric value calculations.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiries concerning this communication should be directed to the examiner, Mujtaba Chaudry who may be reached at 571-272-3817. The examiner may normally be reached Mon – Thur 6:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, please contact the examiner's supervisor, Albert DeCady at 571-272-3819.

Mujtaba Chaudry
Art Unit 2133
April 4, 2006

GUY LAMARRE
PRIMARY EXAMINER